

Application No.: 10/622,201  
Attorney Docket No.: 11899.0175.REUS07

**IN THE CLAIMS OF THE REISSUE APPLICATION:**

Cancel claims 7, 9, 17, 20, 34, 37, 53-56, 59-68, 86, 87, 98-101, 132 and 133.

Amend claims 2-6, 8, 10-16, 18, 19, 21-27 and 29-33, 35, 36, 38-52, 57, 58, 69-85, 88-97, 102-105, 107 and 113, and add new claims 134-155 as follows:

Claim 2 (Amended). [A] The DNA molecule of claim 1 having the sequence of SEQ ID NO:2.

Claim 3 (Amended). [A] The DNA molecule of claim 1 having the sequence of SEQ ID NO:9.

Claim 4 (Twice Amended). A recombinant, double-stranded DNA molecule comprising in sequence:

- a) a promoter which functions in plant cells to cause the production of an RNA sequence;
- b) a structural DNA sequence that causes the production of an RNA sequence which encodes a EPSPS enzyme having the sequence domains:

-R-X<sub>1</sub>-H-X<sub>2</sub>-E- (SEQ ID NO:37), in which

X<sub>1</sub> is G, S, T, C, Y, N, Q, D or E;

X<sub>2</sub> is S or T; and

-G-D-K-X<sub>3</sub>- (SEQ ID NO:38), in which

X<sub>3</sub> is S or T; and

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-S-A-Q-X<sub>4</sub>-K- (SEQ ID NO:39), in which

X<sub>4</sub> is A, R, N, D, C, Q, E, G, H, I, L, K, M, F, P, S, T, W, Y or V; and

-N-X<sub>5</sub>-T-R- (SEQ ID NO:40), in which

X<sub>5</sub> is A, R, N, D, C, Q, E, G, H, I, L, K, M, F, P, S, T, W, Y or V,

provided that when X<sub>1</sub> is D, X<sub>2</sub> is T, X<sub>3</sub> is S, and X<sub>4</sub> is V, then X<sub>5</sub> is A, R, N, D, C, Q, E, G, H, I, L, K, M, F, S, T, W, Y or V; and

c) a 3' non-translated region which functions in plant cells to cause the addition of a stretch of polyadenyl nucleotides to the 3' end of the RNA sequence;

where the promoter is heterologous with respect to the structural DNA sequence and adapted to cause sufficient expression of the encoded EPSPS enzyme to enhance the glyphosate tolerance of a plant cell transformed with the DNA molecule.

Claim 5 (Amended). [A] The DNA molecule of claim 4 in which the structural DNA sequence encodes a fusion polypeptide comprising an amino-terminal chloroplast transit peptide and the EPSPS enzyme.

Claim 6 (Amended). [A] The DNA molecule of claim 4 in which X<sub>1</sub> is D or N; X<sub>2</sub> is S or T; X<sub>3</sub> is S or T; X<sub>4</sub> is V, I or L; and X<sub>5</sub> is P or Q, provided that when X<sub>1</sub> is D, X<sub>2</sub> is T, X<sub>3</sub> is S, and X<sub>4</sub> is V, then X<sub>5</sub> is Q.

Claim 8 (Amended). [A] The DNA molecule of claim 5 in which X<sub>1</sub> is D or N; X<sub>2</sub> is S

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or T; X<sub>3</sub> is S or T; X<sub>4</sub> is V, I or L; and X<sub>5</sub> is P or Q, provided that when X<sub>1</sub> is D, X<sub>2</sub> is T, X<sub>3</sub> is S, and X<sub>4</sub> is V, then X<sub>5</sub> is Q.

Claim 10 (Amended). [A] The DNA molecule of claim [8] 137 in which the EPSPS [sequence] enzyme [is] has the sequence set forth in SEQ ID NO:3.

Claim 11 (Amended). [A] The DNA molecule of claim [10] 4 in which the promoter is a plant DNA virus promoter.

Claim 12 (Amended). [A] The DNA molecule of claim 11 in which the promoter is selected from the group consisting of CaMV35S and FMV35S promoters.

Claim 13 (Amended). [A] The DNA molecule of claim [10] 5 in which the structural DNA sequence encodes a chloroplast transit peptide selected from the group consisting of SEQ ID NO:11 and SEQ ID NO:15.

Claim 14 (Amended). [A] The DNA molecule of claim 13 in which the 3' non-translated region is selected from the group consisting of the NOS 3' and the E9 3' non-translated regions.

Claim 15 (Twice Amended). A method of producing genetically transformed plants which are tolerant toward glyphosate herbicide, comprising the steps of:

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a) inserting into the genome of a plant cell a recombinant, double-stranded DNA molecule comprising:

i) a promoter which functions in plant cells to cause the production of an RNA sequence,

ii) a structural DNA sequence that causes the production of an RNA sequence which encodes an EPSPS enzyme having the sequence domains:

-R-X<sub>1</sub>-H-X<sub>2</sub>-E- (SEQ ID NO:37), in which

X<sub>1</sub> is G, S, T, C, Y, N, Q, D or E;

X<sub>2</sub> is S or T; and

-G-D-K-X<sub>3</sub>- (SEQ ID NO:38), in which

X<sub>3</sub> is S or T; and

-S-A-Q-X<sub>4</sub>-K- (SEQ ID NO:39), in which

X<sub>4</sub> is A, R, N, D, C, Q, E, G, H, I, L, K, M, F, P, S, T, W,

Y or V; and

-N-X<sub>5</sub>-T-R- (SEQ ID NO:40), in which

X<sub>5</sub> is A, R, N, D, C, Q, E, G, H, I, L, K, M, F, P, S, T, W,

Y or V,

provided that when X<sub>1</sub> is D, X<sub>2</sub> is T, X<sub>3</sub> is S, and X<sub>4</sub> is V, then X<sub>5</sub> is A, R, N, D,

C, Q, E, G, H, I, L, K, M, F, S, T, W, Y or V; and

iii) a 3' non-translated DNA sequence which functions in plant cells to cause the addition of a stretch of polyadenyl nucleotides to the 3' end of the RNA

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sequence;

where the promoter is heterologous with respect to the structural DNA sequence and adapted to cause sufficient expression of the polypeptide to enhance the glyphosate tolerance of a plant cell transformed with the DNA molecule;

b) obtaining a transformed plant cell; and

c) regenerating from the transformed plant cell a genetically transformed plant which has increased tolerance to glyphosate herbicide.

Claim 16 (Amended). [A] The method of claim 15 in which  $X_1$  is D or N;  $X_2$  is S or T;  $X_3$  is S or T;  $X_4$  is V, I or L; and  $X_5$  is P or Q, provided that when  $X_1$  is D,  $X_2$  is T,  $X_3$  is S, and  $X_4$  is V, then  $X_5$  is Q.

Claim 18 (Amended). [A] The method of claim 15 in which the structural DNA sequence encodes a fusion polypeptide comprising an amino-terminal chloroplast transit peptide and the EPSPS enzyme.

Claim 19 (Amended). [A] The method of claim 18 in which  $X_1$  is D or N;  $X_2$  is S or T;  $X_3$  is S or T;  $X_4$  is V, I or L; and  $X_5$  is P or Q, provided that when  $X_1$  is D,  $X_2$  is T,  $X_3$  is S, and  $X_4$  is V, then  $X_5$  is Q.

Claim 21 (Amended). [A] The method of claim [19] 143 in which the EPSPS enzyme is that set forth in SEQ ID NO:3.

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Claim 22 (Amended). [A] The method of claim [21] 15 in which the promoter is from a plant DNA virus.

Claim 23 (Amended). [A] The method of claim 22 in which the promoter is selected from the group consisting of CaMV35S and FMV35S promoters.

Claim 24 (Amended). A glyphosate-tolerant plant cell comprising [a] the DNA molecule of [claims] claim 4, 5[,] or 8 [or 10].

Claim 25 (Amended). [A] The glyphosate-tolerant plant cell of claim 24 in which the promoter is a plant DNA virus promoter.

Claim 26 (Amended). [A] The glyphosate-tolerant plant cell of claim 25 in which the promoter is selected from the group consisting of CaMV35S and FMV35S promoters.

Claim 27 (Amended). [A] The glyphosate-tolerant plant cell of claim 24 selected from the group consisting of corn, wheat, rice, barley, soybean, cotton, sugarbeet, oilseed rape, canola, flax, sunflower, potato, tobacco, tomato, alfalfa, poplar, pine, [eukalyptus] eucalyptus, apple, lettuce, peas, lentils, grape and turf grasses.

Claim 29 (Amended). [A] The glyphosate-tolerant plant of claim 28 in which the

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promoter is from a DNA plant virus promoter.

Claim 30 (Amended). [A] The glyphosate-tolerant plant of claim 29 in which the promoter is selected from the group consisting of CaMV35S and FMV35S promoters.

Claim 31 (Amended). [A] The glyphosate-tolerant plant of claim 30 selected from the group consisting of corn, wheat, rice, barley, soybean, cotton, sugarbeet, oilseed rape, canola, flax, sunflower, potato, tobacco, tomato, alfalfa, poplar, pine, [eukalyptus] eucalyptus, apple, lettuce, peas, lentils, grape and turf grasses.

Claim 32 (Twice Amended). A method for selectively controlling weeds in a field containing a crop having planted crop seeds or plants comprising the steps of:

a) planting the crop seeds or plants which are glyphosate-tolerant as a result of a recombinant double-stranded DNA molecule being inserted into the crop seed or plant, the DNA molecule having:

- i) a promoter which functions in plant cells to cause the production of an RNA sequence,
- ii) a structural DNA sequence that causes the production of an RNA sequence which encodes an EPSPS enzyme having the sequence domains:

-R-X<sub>1</sub>-H-X<sub>2</sub>-E- (SEQ ID NO:37), in which

X<sub>1</sub> is G, S, T, C, Y, N, Q, D or E;

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$X_2$  is S or T; and

-G-D-K- $X_3$ - (SEQ ID NO:38), in which

$X_3$  is S or T; and

-S-A-Q- $X_4$ -K- (SEQ ID NO:39), in which

$X_4$  is A, R, N, D, C, Q, E, G, H, I, L, K, M, F, P, S, T, W,

Y or V; and

-N- $X_5$ -T-R- (SEQ ID NO:40), in which

$X_5$  is A, R, N, D, C, Q, E, G, H, I, L, K, M, F, P, S, T, W,

Y or V,

provided that when  $X_1$  is D,  $X_2$  is T,  $X_3$  is S, and  $X_4$  is V, then  $X_5$  is A, R, N, D,

C, Q, E, G, H, I, L, K, M, F, S, T, W, Y or V; and

iii) a 3' non-translated DNA sequence which functions in plant cells to

cause the addition of a stretch of polyadenyl nucleotides to the 3'

end of the RNA sequence,

where the promoter is heterologous with respect to the structural DNA sequence and adapted to cause sufficient expression of the EPSPS enzyme to enhance the glyphosate tolerance of the crop plant transformed with the DNA molecule; and

b). applying to the crop and weeds in the field a sufficient amount of glyphosate herbicide to control the weeds without significantly affecting the crop.

Claim 33 (Amended). [A] The method of claim 32 in which  $X_1$  is D or N;  $X_2$  is S or T;  $X_3$  is S or T;  $X_4$  is V, I or L; and  $X_5$  is P or Q, provided that when  $X_1$  is D,  $X_2$  is T,  $X_3$  is S, and



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X<sub>4</sub> is V, then X<sub>5</sub> is Q.

Claim 35 (Amended). [A] The method of claim 32 in which the structural DNA sequence encodes a fusion polypeptide comprising an amino-terminal chloroplast transit peptide and the EPSPS enzyme.

Claim 36 (Amended). [A] The method of claim 35 in which X<sub>1</sub> is D or N; X<sub>2</sub> is S or T; X<sub>3</sub> is S or T; X<sub>4</sub> is V, I or L; and X<sub>5</sub> is P or Q, provided that when X<sub>1</sub> is D, X<sub>2</sub> is T, X<sub>3</sub> is S, and X<sub>4</sub> is V, then X<sub>5</sub> is Q.

Claim 38 (Amended). [A] The method of claim [36] 155 in which the DNA molecule encodes an EPSPS enzyme as set forth in SEQ ID NO:3.

Claim 39 (Amended). [A] The method of claim [38] 32 in which the DNA molecule further comprises a promoter selected from the group consisting of the CAMV35S and FMV35S promoters.

Claim 40 (Amended). [A] The method of claim 39 in which the crop plant is selected from the group consisting of corn, wheat, rice, barley, soybean, cotton, sugarbeet, oilseed rape, canola, flax, sunflower, potato, tobacco, tomato, alfalfa, poplar, pine, [eukalyptus] eucalyptus, apple, lettuce, peas, lentils, grape and turf grasses.

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Claim 41 (Amended). [A] The DNA molecule of claim 5 in which the structural DNA sequence encodes a chloroplast transit peptide selected from the group consisting of SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:15 and SEQ ID NO:17.

Claim 42 (Amended). [A] The DNA molecule of claim 41 in which the chloroplast transit peptide is encoded by a DNA sequence selected from the group consisting of SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14 and SEQ ID NO:16.

Claim 43 (Amended). [A] The DNA molecule of claim 5 in which the structural DNA sequence encodes a chloroplast transit peptide selected from the group consisting of SEQ ID NO:11 and SEQ ID NO:15.

Claim 44 (Amended). [A] The DNA molecule of claim 43 in which the chloroplast transit peptide is encoded by a DNA sequence selected from the group consisting of SEQ ID NO:10 and SEQ ID NO:14.

Claim 45 (Amended). [A] The DNA molecule of claim 41 in which the promoter is selected from the group consisting of CaMV 35S and FMV 35S promoters.

Claim 46 (Amended). [A] The DNA molecule of claim 42 in which the promoter is selected from the group consisting of CaMV 35S and FMV 35S promoters.

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Claim 47 (Amended). [A] The DNA molecule of claim 43 in which the promoter is selected from the group consisting of CaMV 35S and FMV 35S promoters.

Claim 48 (Amended). [A] The DNA molecule of claim 44 in which the promoter is selected from the group consisting of CaMV 35S and FMV 35S promoters.

Claim 49 (Amended). [A] The DNA molecule of claim 45 in which the 3' non-translated region is selected from the group consisting of the NOS 3' and the E9 3' non-translated regions.

Claim 50 (Amended). [A] The DNA molecule of claim 46 in which the 3' non-translated region is selected from the group consisting of the NOS 3' and the E9 3' non-translated regions.

Claim 51 (Amended). [A] The DNA molecule of claim 47 in which the 3' non-translated region is selected from the group consisting of the NOS 3' and the E9 3' non-translated regions.

Claim 52 (Amended). [A] The DNA molecule of claim 48 in which the 3' non-translated region is selected from the group consisting of the NOS 3' and the E9 3' non-translated regions.

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Claim 57 (Twice Amended). [A] The DNA molecule of claim [53] 137 in which the structural DNA sequence contains an EPSPS encoding sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:4, and SEQ ID NO:6 [, SEQ ID NO:41 and SEQ ID NO:43].

Claim 58 (Twice Amended). [A] The DNA molecule of claim [54] 137 in which the structural DNA sequence contains an EPSPS encoding sequence [selected from the group consisting of SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:41 and SEQ ID NO:43] as set forth in SEQ ID NO:9.

Claim 69 (Twice Amended). [A] The glyphosate-tolerant plant cell of claim [25] 149 in which:

- (a) the promoter is selected from the group consisting of CaMV 35S and FMV 35S promoters;
- (b) the structural DNA sequence encodes:
  - (i) a chloroplast transit peptide selected from the group consisting of SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:15 and SEQ ID NO:17; and
  - (ii) an EPSPS enzyme selected from the group consisting of SEQ ID NO:3, SEQ ID NO:5, and SEQ ID NO:7 [, SEQ ID NO:42 and SEQ ID NO:44]; and
- (c) the 3' non-translated region is selected from the group consisting of the NOS 3' and the E9 3' non-translated regions.

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Claim 70 (Twice Amended). [A] The glyphosate-tolerant plant cell of claim 69 in which the structural DNA sequence comprises:

- (a) a chloroplast transit peptide encoding DNA sequence selected from the group consisting of SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14 and SEQ ID NO:16; and
- (b) an EPSPS encoding sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:4, and SEQ ID NO:6 [, SEQ ID NO:41 and SEQ ID NO:43].

Claim 71 (Amended). [A] The glyphosate-tolerant plant cell of claim 69 in which the structural DNA sequence comprises:

- a) a chloroplast transit peptide encoding DNA sequence selected from the group consisting of SEQ ID NO:10 and SEQ ID NO:14; and
- b) a DNA sequence encoding an EPSPS enzyme having the sequence of SEQ ID NO:3.

Claim 72 (Amended). [A] The glyphosate-tolerant plant cell of claim 71 in which the structural DNA sequence comprises an EPSPS encoding sequence [selected from the group consisting of SEQ ID NO:2 and] as set forth in SEQ ID NO:9.

Claim 73 (Amended). [A] The glyphosate-tolerant plant cell of claim 71 selected from the group consisting of corn, wheat, rice, barley, soybean, cotton, sugarbeet, oilseed rape, canola, flax, sunflower, potato, tobacco, tomato, alfalfa, poplar, pine, [eukalyptus] eucalyptus, apple, lettuce, peas, lentils, grape and turf grasses.

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Claim 74 (Twice Amended). A glyphosate-tolerant plant comprising a DNA molecule of [claims 5, 8 or 10] claim 137 in which:

- (a) the promoter is selected from the group consisting of CaMV 35S and FMV 35S promoters;
- (b) the structural DNA sequence encodes:
  - (i) a chloroplast transit peptide selected from the group consisting of SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:15 and SEQ ID NO:17; and
  - (ii) an EPSPS enzyme selected from the group consisting of SEQ ID NO:3, SEQ ID NO:5, and SEQ ID NO:7 [, SEQ ID NO:42 and SEQ ID NO:44]; and
- (c) the 3' non-translated region is selected from the group consisting of the NOS 3' and the E9 3' non-translated regions.

Claim 75 (Twice Amended). [A] The glyphosate-tolerant plant of claim 74 in which the structural DNA sequence comprises:

- (a) a chloroplast transit peptide encoding DNA sequence selected from the group consisting of SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14 and SEQ ID NO:16; and
- (b) an EPSPS encoding sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:4, and SEQ ID NO:6 [, SEQ ID NO:41 and SEQ ID NO:43].

Claim 76 (Amended). [A] The glyphosate-tolerant plant of claim 75 in which the structural DNA sequence comprises:

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- a) a chloroplast transit peptide encoding DNA sequence selected from the group consisting of SEQ ID NO:10 and SEQ ID NO:14; and
- b) a DNA sequence encoding an EPSPS enzyme having the sequence of SEQ ID NO:3.

Claim 77 (Amended). [A] The glyphosate-tolerant plant of claim [76] 74 in which the structural DNA sequence comprises an EPSPS encoding sequence [selected from the group consisting of SEQ ID NO:2 and] as set forth in SEQ ID NO:9.

Claim 78 (Amended). [A] The glyphosate-tolerant plant of claim [77] 74 selected from the group consisting of corn, wheat, rice, barley, soybean, cotton, sugarbeet, oilseed rape, canola, flax, sunflower, potato, tobacco, tomato, alfalfa, poplar, pine, [eukalyptus] eucalyptus, apple, lettuce, peas, lentils, grape and turf grasses.

Claim 79 (Amended). A seed of [a] the glyphosate-tolerant plant of claim 28, wherein the seed comprises the DNA molecule of claim 4, 5 or 8.

Claim 80 (Amended). A seed of [a] the glyphosate-tolerant plant of claim 31, wherein the seed comprises the DNA molecule of claim 4, 5 or 8.

Claim 81 (Amended). A seed of [a] the glyphosate-tolerant plant of claim 75, wherein the seed comprises the structural DNA sequence of claim 75.

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Claim 82 (Amended). A seed of [a] the glyphosate-tolerant plant of claim 76, wherein the seed comprises the structural DNA sequence of claim 76.

Claim 83 (Amended). A seed of [a] the glyphosate-tolerant plant of claim 77, wherein the seed comprises the structural DNA sequence of claim 77.

Claim 84 (Amended). A seed of [a] the glyphosate-tolerant plant of claim [78] 135, wherein the seed comprises the DNA molecule of claim 107.

Claim 85 (Amended). A seed of [a] the glyphosate-tolerant plant of claim [79] 150, wherein the seed comprises the DNA molecule of claim 137.

Claim 88. The DNA molecule of claim 6 in which the structural DNA sequence contains an EPSPS encoding sequence selected from the group consisting of SEQ ID NO:41 and SEQ ID NO:43.

Claim 89. The DNA molecule of claim 8 in which the structural DNA sequence contains an EPSPS encoding sequence selected from the group consisting of SEQ ID NO:41 and SEQ ID NO:43.

Claim 90. The method of claim 16 in which the structural DNA sequence contains an



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EPSPS encoding sequence selected from the group consisting of SEQ ID NO:41 and SEQ ID NO:43.

Claim 91. The method of claim 19 in which the structural DNA sequence encodes an EPSPS enzyme selected from the group consisting of SEQ ID NO:42 and SEQ ID NO:44.

Claim 92. The method of claim 33 in which the structural DNA sequence encodes an EPSPS enzyme selected from the sequences as set forth in SEQ ID NO:42 and SEQ ID NO:44.

Claim 93. The method of claim 36 in which the structural DNA sequence contains an EPSPS encoding sequence selected from the group consisting of SEQ ID NO:41 and SEQ ID NO:43.

Claim 94. The DNA molecule of claim 49 in which the structural DNA sequence encodes an EPSPS enzyme selected from the group consisting of SEQ ID NO:42 and SEQ ID NO:44.

Claim 95. The DNA molecule of claim 50 in which the structural DNA sequence encodes an EPSPS enzyme selected from the group consisting of SEQ ID NO:42 and SEQ ID NO:44.

Claim 96. The DNA molecule of claim 51 in which the structural DNA sequence

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encodes an EPSPS enzyme selected from the group consisting of SEQ ID NO:42 and SEQ ID NO:44.

Claim 97. The DNA molecule of claim 52 in which the structural DNA sequence encodes an EPSPS enzyme selected from the group consisting of SEQ ID NO:42 and SEQ ID NO:44.

Claim 102. The glyphosate-tolerant plant cell of claim 25 in which:

a) the promoter is selected from the group consisting of CaMV 35S and FMV 35S promoters;

b) the structural DNA sequence encodes:

i) a chloroplast transit peptide selected from the group consisting of SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:15 and SEQ ID

NO:17; and

ii) an EPSPS enzyme selected from the group consisting of SEQ ID NO:42 and SEQ ID NO:44; and

c) the 3' non-translated region is selected from the group consisting of the NOS 3' and the E9 3' non-translated regions.

Claim 103. The glyphosate-tolerant plant cell of claim 26 in which the structural DNA sequence comprises:

a) a chloroplast transit peptide encoding DNA sequence selected from the group

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consisting of SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14 and SEQ ID NO:16; and

b) an EPSPS encoding sequence selected from the group consisting of SEQ ID NO:41 and SEQ ID NO:43.

Claim 104. A glyphosate-tolerant plant comprising [a] the DNA molecule of claim 4, 5 or 8 in which:

a) the promoter is selected from the group consisting of CaMV 35S and FMV 35S promoters;

b) the structural DNA sequence encodes:

(i) a chloroplast transit peptide selected from the group consisting of SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:15 and SEQ ID NO:17; and

(ii) an EPSPS enzyme selected from the group consisting of SEQ ID NO:42 and SEQ ID NO:44; and

(c) the 3' non-translated region is selected from the group consisting of the NOS 3' and the E9 3' non-translated regions.

Claim 105. The glyphosate-tolerant plant of claim 28 in which the structural DNA sequence comprises:

a) a chloroplast transit peptide encoding DNA sequence selected from the group consisting of SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14 and SEQ ID NO:16; and

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b) an EPSPS encoding sequence selected from the group consisting of SEQ ID NO:41 and SEQ ID NO:43.

Claim 107. A recombinant, double-stranded DNA molecule comprising in sequence:

- a) a promoter which functions in plant cells to cause the production of an RNA sequence;
- b) a structural DNA sequence that causes the production of an RNA sequence which encodes an EPSPS enzyme having the sequence of SEQ ID NO:70; and
- c) a 3' non-translated region that functions in plant cells to cause the addition of a stretch of polyadenyl nucleotides to the 3' end of the RNA sequence;
- where the promoter is heterologous with respect to the structural DNA sequence and adapted to cause sufficient expression of the encoded EPSPS enzyme to enhance the glyphosate tolerance of a plant cell transformed with the DNA molecule.

Claim 113. A method of producing a genetically transformed plant which is tolerant toward glyphosate herbicide, comprising the steps of:

- a) inserting into the genome of a plant cell a recombinant, double-stranded DNA molecule comprising:
- i) a promoter that functions in plant cells to cause the production of an RNA sequence;
- ii) a structural DNA sequence that causes the production of an RNA sequence [that comprises the sequence encoding] which encodes an EPSPS

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enzyme [comprising] having the sequence of SEQ ID NO. 70; and

iii) a 3' non-translated DNA sequence [that] which functions in plant cells to

cause the addition of a stretch of polyadenyl nucleotides to the 3'

end of the RNA sequence;

where the promoter is heterologous with respect to the structural DNA sequence and

adapted to cause sufficient expression of the polypeptide to enhance the glyphosate

tolerance of a plant cell transformed with the DNA molecule;

b) obtaining a transformed plant cell; and

c) regenerating from the transformed plant cell a genetically transformed plant [that]

which has increased tolerance to glyphosate herbicide.

Claim 134. A glyphosate tolerant plant cell comprising a DNA molecule of claim 107.

Claim 135. A plant comprising a glyphosate tolerant plant cell of claim 134.

Claim 136. A method for selectively controlling weeds in a field containing a crop  
having planted crop seeds or plants comprising the steps of:

a) planting the crop seeds or plants which are glyphosate-tolerant as a result of a  
recombinant double-stranded DNA molecule being inserted into the crop seed or plant, the DNA  
molecule having:

i) a promoter which functions in plant cells to cause the production  
of an RNA sequence.

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ii) a structural DNA sequence that causes the production of an RNA sequence which encodes an EPSPS enzyme having the sequence of SEQ ID NO:70; and

iii) a 3' non-translated DNA sequence which functions in plant cells to cause the addition of a stretch of polyadenyl nucleotides to the 3' end of the RNA sequence.

where the promoter is heterologous with respect to the structural DNA sequence and adapted to cause sufficient expression of the EPSPS enzyme to enhance the glyphosate tolerance of the crop plant transformed with the DNA molecule; and

b) applying to the crop and weeds in the field a sufficient amount of glyphosate herbicide to control the weeds without significantly affecting the crop.

Claim 137. A recombinant, double-stranded DNA molecule comprising in sequence:

a) a promoter which functions in plant cells to cause the production of an RNA sequence;

b) a structural DNA sequence that causes the production of an RNA sequence which encodes an EPSPS enzyme having the sequence of SEQ ID NO:3, SEQ ID NO. 5 or SEQ ID NO.

7;

c) a 3' non-translated region which functions in plant cells to cause the addition of a stretch of polyadenyl nucleotides to the 3' end of the RNA sequence;

where the promoter is heterologous with respect to the structural DNA sequence and

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adapted to cause sufficient expression of the encoded EPSPS enzyme to enhance the glyphosate tolerance of a plant cell transformed with the DNA molecule.

Claim 138. A DNA molecule of claim 137 in which the structural DNA sequence encodes a fusion polypeptide comprising an amino-terminal chloroplast transit peptide and the EPSPS enzyme.

Claim 139. The DNA molecule of claim 137 in which the promoter is a plant DNA virus promoter.

Claim 140. The DNA molecule of claim 139 in which the promoter is selected from the group consisting of CaMV35S and FMV35S promoters.

Claim 141. The DNA molecule of claim 137 in which the structural DNA sequence encodes a chloroplast transit peptide selected from the group consisting of SEQ ID NO:11 and SEQ ID NO:15.

Claim 142. The DNA molecule of claim 137 in which the 3' non-translated region is selected from the group consisting of the NOS 3' and the E9 3' non-translated regions.

Claim 143. A method of producing genetically transformed plants which are tolerant toward glyphosate herbicide, comprising the steps of:

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a) inserting into the genome of a plant cell a recombinant, double-stranded DNA molecule comprising:

- i) a promoter which functions in plant cells to cause the production of an RNA sequence,
- ii) a structural DNA sequence that causes the production of an RNA sequence which encodes an EPSPS enzyme having the sequence of SEQ ID NO:3, SEQ ID NO:5 or SEQ ID NO:7; and
- iii) a 3' non-translated DNA sequence which functions in plant cells to cause the addition of a stretch of polyadenyl nucleotides to the 3' end of the RNA sequence;

where the promoter is heterologous with respect to the structural DNA sequence and adapted to cause sufficient expression of the polypeptide to enhance the glyphosate tolerance of a plant cell transformed with the DNA molecule;

- b) obtaining a transformed plant cell; and
- c) regenerating from the transformed plant cell a genetically transformed plant which has increased tolerance to glyphosate herbicide.

Claim 144. The method of claim 143 in which the structural DNA sequence encodes a fusion polypeptide comprising an amino-terminal chloroplast transit peptide and the EPSPS enzyme.



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Claim 145. The method of claim 143, wherein the chloroplast transit peptide has the sequence of SEQ ID NO:11 or SEQ ID NO:15.

Claim 146. The method of claim 143 in which the promoter is a plant DNA virus.

Claim 147. A method of claim 146 in which the promoter is a CaMV35S promoter or a FMV35S promoter.

Claim 148. The method of claim 143, wherein the 3' non-translated DNA sequence is a NOS 3' or an e9 3' non-translated sequence.

Claim 149. A glyphosate-tolerant plant cell comprising a DNA molecule of claim 137.

Claim 150. A plant comprising a glyphosate-tolerant plant cell of claim 149.

Claim 151. A glyphosate-tolerant plant cell comprising an EPSPS enzyme having the sequence of SEQ ID NO:3, SEQ ID NO:5 or SEQ ID NO:7.

Claim 152. A plant comprising an EPSPS enzyme having the sequence of SEQ ID NO:3, SEQ ID NO:5 or SEQ ID NO:7.

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Claim 153. A glyphosate-tolerant plant cell of claim 149 or 151 selected from the group consisting of corn, wheat, rice, barley, soybean, cotton, sugarbeet, oilseed rape, canola, flax, sunflower, potato, tobacco, tomato, alfalfa, poplar, pine, eucalyptus, apple, lettuce, peas, lentils, grape and turf grasses.

Claim 154. A glyphosate-tolerant plant of claim 150 or 152 selected from the group consisting of corn, wheat, rice, barley, soybean, cotton, sugarbeet, oilseed rape, canola, flax, sunflower, potato, tobacco, tomato, alfalfa, poplar, pine, eucalyptus, apple, lettuce, peas, lentils, grape and turf grasses.

Claim 155. A method for selectively controlling weeds in a field containing a crop having planted crop seeds or plants comprising the steps of:

a) planting the crop seeds or plants which are glyphosate-tolerant as a result of a recombinant double-stranded DNA molecule being inserted into the crop seed or plant, the DNA molecule having:

- i) a promoter which functions in plant cells to cause the production of an RNA sequence,
- ii) a structural DNA sequence that causes the production of an RNA sequence which encodes an EPSPS enzyme having the sequence of SEQ ID NO:3, SEQ ID NO:5, or SEQ ID NO:7; and
- iii) a 3' non-translated DNA sequence which functions in plant cells to

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cause the addition of a stretch of polyadenyl nucleotides to the 3'

end of the RNA sequence,

where the promoter is heterologous with respect to the structural DNA sequence and adapted to cause sufficient expression of the EPSPS enzyme to enhance the glyphosate tolerance of the crop plant transformed with the DNA molecule; and

b) applying to the crop and weeds in the field a sufficient amount of glyphosate herbicide to control the weeds without significantly affecting the crop,